DISPUTE RESOLUTION STATEMENT OF POSITION

Phoenix-Goodyear Airport-North Superfund Site
Goodyear, Arizona

Submitted To: United States Environmental Protection Agency

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EXECUTIVE SUMMARY

Crane Co. has prepared this Dispute Resolution Statement of Position (Statement of Position), in response to the September 9, 2010 letter from Mr. Clancy Tenley, Assistant Director, Superfund Division, United States Environmental Protection Agency (USEPA) Region IX (EPA, 2010a). In Mr. Tenley's letter, the USEPA directed Crane Co. to install two additional injection wells, i.e., in addition to the three injection wells Crane Co. already has installed and/or is planning to install as part of the expanded groundwater extraction and treatment system in the northeast area. The Statement of Position has been prepared to provide the USEPA with multiple lines of evidence that include past and recently obtained data which demonstrate that the USEPA position on this matter is not technically defensible, is arbitrary, and is the result of stakeholder and public pressure. The installation of two additional injection wells is not technically justified to contain the Subunit A plume and continue to protect local water supplies.

As outlined on several occasions at meetings and in numerous correspondences, Crane Co. is <u>fully committed to preventing the possible expansion of the trichloroethene (TCE) plume</u>, not only in the northeast area, but in all areas associated with the Phoenix-Goodyear Airport-North Superfund Site (the Site) TCE plume. Crane Co. has used multiple lines of evidence to evaluate the need for the two additional disputed injection wells as directed by the USEPA. Crane Co.'s analysis supports the conclusion that three injection wells are more than sufficient to contain the plume and protect the water supply wells east and northeast of the Subunit A TCE plume.

Crane Co. contends that the USEPA's position is not supported by past or current data – including the most recent real-time data from the operation of newly installed injection wells IA-11 and IA-12. These data show groundwater level responses to reinjection which demonstrate that the USEPA conclusion that a minimum of five injection wells is not technically justified.

Crane Co. also has provided chemical and groundwater flow data which show that the TCE plume in the northeast area is not rapidly moving nor escaping as contended by the USEPA and other stakeholders. This is clearly demonstrated by the monitoring data collected from key sentinel wells that continue to exhibit TCE levels below the site clean-up standard (5 µg/l).

In its September 9, 2010 letter, USEPA states "…the EPA believes that the groundwater flow direction in the Northern Area of the plume will likely return to the Northeast…" Crane Co. believes that USEPA's conclusion does not adequately account for the effects of flow in the plume's northern area created by almost three years of operation of the EA-06 groundwater extraction and treatment system and also does not account for effects that are expected from the start-up of extraction well EA-07.

Crane Co.'s technical analysis <u>is not predicated</u> on the groundwater flow remaining to the north or northwest. As part of this Statement of Position, Crane Co. clearly will demonstrate, through multiple lines of evidence, that the proposed three injection wells will maintain a sufficient hydraulic barrier at Dysart Road, including:

- An evaluation of historical data in the northeast area of the site.
- An examination of recently obtained data collected during startup of operations at IA-11 and IA-12.
- An evaluation of chemical data from northeast area wells that indicate a stable plume.
- Groundwater modeling analyses.
- Analysis of water levels in the northeast area under actual reinjection conditions, even with an eastward or northeastward assumed flow direction.

Finally, the USEPA assumes that the area of a one-foot rise in groundwater elevation is required to create a significant hydraulic barrier for an injection well. This Statement of Position addresses the limitations of USEPA'S assumption and demonstrates that a one-foot rise is not required for containment. Because USEPA's assumption, which is the sole technical basis for the position that five injection wells are required, is incorrect, USEPA's position is not technically defensible and is arbitrary.

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1.0 INTRODUCTION

Over the past five years, Crane Co. has undertaken a number of important steps to enhance our understanding of the nature and extent of groundwater contamination present at the Site. During this time Crane Co. also have greatly increased the scope of hydraulic containment afforded by the remedy. Consistent with the Consent Decree and the Scope of Work (CD/SOW), Crane Co. has achieved the following major milestones;

- Conducted extensive groundwater investigation activities including the installation of 44 monitor wells and plume characterization efforts covering both major water bearing subunits in the Upper Alluvial Unit (UAU) and has confirmed that no TCE impacts have migrated from the UAU into the Middle Alluvial Unit (MAU);
- Installed and operated two new groundwater extraction and treatment systems (EA-05 and EA-06);
- Expanded the groundwater extraction and treatment capacity of the Main Treatment System (MTS); and
- Implemented a major expansion of one of the two newly installed systems (EA-06).

Investigation activities also included locating, studying, and subsequently abandoning a number of conduit wells and former drinking water supply wells, which were a potential threat to deeper water supplies. All of these milestones were accomplished in accordance with the scope and schedule of Work Plans approved by the USEPA under the CD/SOW.

1.1 INVESTIGATION AND RELATED ACTIONS PERFORMED SINCE 2005

Under Task 3 of the CD/SOW, Crane Co. is in the process of completing a multi-year groundwater investigation. Since 2005, Crane Co. has completed the following;

- Installation of 28 new Subunit A monitor wells.
- Installation of 14 new Subunit C monitor wells.
- Installation of 2 new MAU monitor wells.

As evidenced by the monitoring data in Subunit A and Subunit C, Crane Co. has been continually resolving data-gap issues and currently has a very good definition of the overall extent of the Subunit A and C plumes. Furthermore, the monitoring network that has been developed will allow for rapid identification and assessment of changing groundwater conditions. An example of this was the ability to identify and characterize changes in the groundwater flow field in the northeast area that occurred in late 2009 and early 2010.

1.2 ADDITIONAL REMEDIATION ACTIVITIES PERFORMED AND RESULTS SINCE 2005

As outlined below, Crane Co. has taken several significant steps in expanding the groundwater extraction and treatment systems at the Site in order to contain the extent of the TCE plume in both Subunit A and Subunit C and provide additional mass removal for both TCE and perchlorate. A summary of the key additional work that Crane Co. has performed since 2005 includes the following;

- Installation of the EA-05/IA-10 treatment system – which operates at over 500 gallons per minute (gpm) of extraction capacity.
- Installation of the EA-06 treatment system – which operates at over 500 gpm of extraction capacity.
- Addition of injection wells IA-11, IA-12 and planned addition of IA-13 to the EA-06 treatment system in November 2010 to receive all the water treated by the EA-06 system.
- The planned addition of extraction well EA-07 to the northeast/EA-06 treatment system which is intended to increase the groundwater extraction in the northeast area by up to 50% in late September 2010.
- Multiple modifications to the on-site MTS, which include additional treatment capacity, additional injection wells, and addition of new extraction wells in Subunit A and Subunit C.

Groundwater extraction and treatment operations began in the northeast area in late 2007/early 2008. Extraction well EA-06 came on-line in December 2007 and extraction well EA-05 and injection well IA-10 came on-line in March 2008. Since then, these wells have operated almost continuously; pumping, treating, removing TCE mass, and re-injecting treated groundwater exclusively within Subunit A. The extensive volume of water extracted and re-injected over the two and a half year period these wells have operated has significantly contributed to the overall change in groundwater flow directions in the northeast area. For example, since system start up;

- Extraction well EA-05 has an average pumping rate of 501 gpm. Groundwater extraction volumes have increased every year since system start-up and has extracted, treated, and re-injected over 651 million gallons of water (1,999 acre-feet).
- Extraction well EA-06 has an average pumping rate of 482 gpm. EA-06 has pumped and treated over 678 million gallons of water (2,081 acre-feet).

Based on implementation of these measures, Crane Co. has tripled the overall groundwater extraction from roughly 290 million gallons extracted in 2006 (roughly 550 gpm) to an estimated extraction total of 1,130 million gallons for 2010 (roughly 2,160 gpm). This has resulted in a 100% increase in overall TCE mass removal with an estimated recovery of roughly 700 pounds of TCE in 2005 to a projected total of almost 1,400 pounds in 2010.

As evidenced by the large amount of work performed by Crane Co. as outlined above, Crane Co. unquestionably has maintained the high level of technical and financial commitment required to enhance the remedy and control plume migration. However, as stated on numerous occasions, Crane Co. will not voluntarily perform work that is not technically justified and is required merely in response to stakeholder and public pressure.

Crane Co. will continue to take all necessary steps to maintain plume control. All such necessary steps, however, will be based on sound science and technical justification derived from field data collected at the Site.

2.0 PURPOSE

Crane Co. has prepared this Statement of Position to achieve several objectives;

- Provide USEPA with the most up-to-date technical information from the Site with regard to ongoing operation of the two newly installed injection wells. Based on Crane Co.'s analysis of real-time field data, it is demonstrated that the actual site conditions in this area are significantly different from the hypothetical conditions presented in the analyses performed by Innovative Technical Solutions, Inc. Technical Memorandum, dated August 24. 2010 (ITSI, 2010).
- Provide USEPA with Crane Co.'s recent data collection efforts and analysis of the performance of the three proposed injection wells (IA-11, IA-12, and IA-13). In order to evaluate the proposed system under a possible range of future conditions, the analysis is based on current groundwater flow patterns (north/northwest) as well as assumed future groundwater flow patterns that could return the regional groundwater flow directions toward the northeast.

- Provide review and comment on both the mounding analysis performed by USEPA and the acceptable performance criteria established by USEPA.

3.0 CURRENT GROUNDWATER FLOW AND QUALITY CONDITIONS IN THE NORTHEAST AREA

As outlined in Section 1.0 above, over the past several years, Crane Co. expended significant effort to fully characterize the Subunit A TCE plume with a particular focus on the northeast area. Crane Co. now maintains a series of key monitoring wells in the northeast area and has collected a large amount of chemical constituent and water level data in the area over the past several years. Acquisition of this data has allowed Crane Co. to develop a conceptual model for groundwater flow and plume behavior. Multiple lines of evidence clearly demonstrate that the TCE plume in Subunit A is not rapidly moving and/or 'out of control' as alleged by USEPA, ADEQ, and stakeholders. Rather, the plume is quite stable in the northeast area.

From analysis of the groundwater elevation data we have drawn the following key conclusions;

- Potentiometric surface maps and associated flow vector analyses demonstrate that the groundwater flow directions over the last two years (2009 through 2010) in the northeast area have shifted from the northeast to the north/northwest.
- The influence on groundwater elevations in Subunit A monitor wells in the northeast area resulting from the January 2010 storm event and associated recharge along the Agua Fria River channel are not as significant as suggested by the USEPA. Supporting evidence includes:
  - The storm's alleged effect is not supported by calculated travel times and data trends observed in monitor well EPA MW-45A.
  - The increase in groundwater elevations observed in EPA MW-45A began in November 2009, nearly two months <u>prior</u> to the storm in late January 2010.
  - The observed effects on groundwater flow attributable to the continuous operation of extraction wells EA-05 and EA-06 for the past 2.5 years and the seasonal operation of City of Avondale supply well COA-18 and Irrigation Well 3B (IR-3B) account for the increase in groundwater elevations and resulting shift in groundwater flow directions.

Furthermore, review and analysis of the well sampling data (laboratory analyses) support the conclusion that the Subunit A TCE plume in the northeast area is stable. The data certainly do not support a conclusion that the plume is moving "rapidly" as contended by USEPA, ADEQ, and stakeholders. The plume's stability also is supported by several lines of evidence.

- Sentinel wells EPA MW-45A (installed in April 2009) and EPA MW-39A (installed in July 2009) continue to exhibit non-detect concentrations of TCE and continue to define the eastern boundary of the Subunit A TCE plume west of Dysart Road.
- Sentinel wells EPA MW-31A and EPA MW-34A in the northeast area continue to exhibit concentrations below the maximum contaminant level (MCL) of 5 micrograms per liter (µg/L) for TCE.
- Since installation in January of 2009, concentrations of TCE in well EPA MW-43A have remained stable and generally below the MCL of 5 µg/L.
- Since the installation of EPA MW-55A in July 2010, TCE in this well has not been detected.

If the Subunit A TCE plume was, in fact, rapidly moving in the northeast direction as contended by USEPA, ADEQ, and other stakeholders, we would expect to see increasing TCE concentrations in some or all of these wells. This has not been the case. The absence of TCE in these wells strongly supports Crane Co.'s analysis that the groundwater flow direction in the northeast area has been altered, in significant part, by continued groundwater withdrawal (EA-05 and EA-06) associated with the operation of these treatment systems over the past several years.

4.0 RECENT AUGMENTATION SYSTEMS

Crane Co. has completed Phase 1 (with the exception of IA-13, scheduled for November 2010 installation) of the USEPA approved Amended Draft Comprehensive Regional Approach for Northeast Subunit A Plume Capture Augmentation and Treatment Work Plan, dated May 20, 2010 (AMEC, 2010a). Crane Co. has installed extraction well EA-07 interior to the Subunit A TCE plume boundary to allow for additional plume containment while maximizing the removal of TCE from groundwater. In addition, Crane Co. has installed injection wells IA-11 and IA-12 along with six miles of associated piping to maintain an effective hydraulic barrier between public supply wells and the eastern/northeastern Subunit A TCE plume boundary.

As stated in the work plan, "…the northeast regional expansion will be completed using a phased approach for the installation of new extraction and/or injection wells and associated piping systems. This proposed remedy enhancement will provide stepwise control for the northeast portion of the Subunit A TCE plume and is designed based on the ongoing technical evaluation and interpretation of current and proposed groundwater monitoring data and hydraulic evaluations to ensure protection of drinking water production wells to the north and east."

It is important to consider the impact of groundwater extraction from the EA-07 system on overall plume containment. The USEPA's analysis ignores this well which will provide valuable information in the very near future on the system's effectiveness. As a result, USEPA's plume containment assessment is scientifically unsound and arbitrary.

5.0 EVALUATION OF RECENT INJECTION WELL DATA

5.1 CURRENT INJECTION DATA

Injection of treated groundwater at injection wells IA-11 and IA-12 was initiated on August 17, 2010. Data from just the first month of injection already indicates that groundwater mounding is occurring and is affecting groundwater elevations and flow directions in the northeast area.

In order to graphically demonstrate the effects of injection wells IA-11 and IA-12, a series of scaled hydrogeologic cross sections (A-A', B-B', C-C', and D-D') were developed for the northeast area (Figure 1). The cross sections compare the pre-injection August 2010 water levels (shown in purple) to water levels collected on September 20, 2010 (shown in blue). The groundwater elevations depicted on the cross sections were derived from depth to water measurements collected by hand using an electronic water level indicator.

In order to graphically illustrate the overall trends in groundwater elevations as a result of the operation of injection wells IA-11 and IA-12, changes in groundwater elevations derived from transducer data were plotted against time (Figure 2 and Figure 5).

5.1.1 Injection Well IA-11

In the area of injection well IA-11, water levels have been increasing in monitor wells EPA MW-43A, EPA MW-34A, EPA MW-30A, and EPA MW-55A since injection began (Figure 2).

- Water levels have increased 1.4 feet in EPA MW-43A, located 1,049 feet south of IA-11; 0.65 feet in EPA MW-34A, located 1,567 feet west of IA-11; 0.9 feet in EPA MW-30A, located 1,435 feet southwest of IA-11; and 0.53 feet in EPA MW-55A, located 2,283 feet south of IA-11, for only about one month of injection through September 20, 2010.

Cross section A-A' trends southwest to northeast from EPA MW-30A to EPA MW-43A to IA-11 (Figure 3).

- Based on the September 20, 2010 water level data, the groundwater elevation in EPA MW-43A (882.48 feet) is higher than that in EPA MW-30A (882.20 feet) by 0.28 feet, demonstrating that a groundwater mound is developing.

Cross section B-B’ trends west to east from EPA MW-34A to IA-11 (Figure 4).

- Since injection of groundwater began, water levels in EPA MW-34A have increased 0.65 feet demonstrating that a groundwater mound is developing from IA-11 to the west beyond EPA MW-34A.

Based on water level data collected from the northeast area monitor wells and the ongoing injection of groundwater at IA-11, the cross sections clearly show a groundwater mound developing in the area of IA-11, which is fairly extensive after only about one month of injection. These data clearly demonstrate that an effective hydraulic barrier is developing that will maintain effective hydraulic control of the Subunit A plume.

5.1.2 Injection Well IA-12

In the area of injection well IA-12, water levels have been increasing in monitor wells EPA MW-45A, EPA MW-35A, and EPA MW-39A since injection began. Water levels also have been steadily increasing in piezometers PZ-11 and PZ-12 since injection started (Figure 5).

- Water levels have increased 3.2 feet in EPA MW-45A, located 487 feet west of IA-12; 0.16 feet in EPA MW-35A, located 2,373 feet west of IA-12; and 1.0 foot in EPA MW-39A, located 1,865 feet north of IA-12, for only about one month of injection through September 20, 2010.
- Water levels have increased by 6.81 feet in PZ-11 and 6.44 feet in PZ-12, as of September 20, 2010.

Cross section C-C’ trends west to east from EPA MW-35A to EPA MW-45A to IA-12 (Figure 6).

- Based on the September 20, 2010 water level data, the groundwater elevation in EPA MW-45A (889.44 ft) is higher than that in EPA MW-35A (883.43) by 6 feet, clearly demonstrating the development of a groundwater mound that will provide an effective hydraulic barrier.

Based on water level data collected from the northeast area monitor wells and the ongoing injection of groundwater in IA-12, the cross section clearly shows a groundwater mound developing in the IA-12 area. The effects of groundwater mounding after one month of injection clearly indicate that an effective hydraulic barrier is developing that will maintain effective hydraulic control of the Subunit A plume.

5.1.3 Northeast Regional Hydraulic Barrier

Cross section D-D’ trends south to north from IA-12 to IA-11 (Figure 7).

- Within a month of groundwater injection at IA-12, its radius of influence extends beyond monitor well EPA MW-39A located 1,865 feet north of IA-12. During this time groundwater elevations in EPA MW-39A have increased 1-foot.
- Within a month of groundwater injection at IA-11, its radius of influence extends beyond monitor well EPA MW-55A located 2,283 feet south of IA-11. During this time groundwater elevations in EPA MW-55A have increased 0.5-foot.

As shown in Figure 7, the current injections at IA-11 and IA-12 have developed a radius of influence within approximately one month that are much greater than the hypothetical values predicted by ITSI (2010) for much longer time periods. The 0.5-foot mound in monitor well EPA MW-55A along with the distance from injection well IA-11 to EPA MW-55A of approximately 2,283 feet indicates that the actual radius of influence is almost 2 ½ times that of the calculated radius of influence (1-foot of mounding at 850 feet) in Innovative Technical Solutions, Inc. Technical Memorandum, dated August 24. 2010.

Any potential gap in the hydraulic barrier between IA-11 and IA-12 will be filled by installation of IA-13 which is planned for November 2010. A mounding analysis at IA-13 was performed to investigate its potential effects. Injection well IA-13 is shown with an estimated groundwater mound of 67 feet (Figure 7). This mound was calculated based on an injection rate of approximately 250 gpm and a transmissivity of 938 square feet per day (ft2/day). As shown in Figure 7, the installation of IA-13 will further increase water levels in the vicinity of Dysart Road, thus eliminating the potential gap between IA-11 and IA-12 and providing an effective and continuous hydraulic barrier.

5.2 SUMMARY OF ADDITIONAL TRANSDUCER DATA

Transducer data from additional monitor wells (EPA MW-18A, EPA MW-16A, EPA MW-23A, EPA MW-36A, EPA MW-38A, MW-16, and PZ-13) were reviewed for local or regional influences that may be affecting water levels associated with injection at IA-11 and IA-12 (Figure 8).

During injection activities associated with IA-11 and IA-12, external influences from the cyclic operation of IR-3B were observed in monitor well EPA MW-36A (Figure 8). Monitor well EPA MW-23A indicates a response to extraction well EA-06 being shut down. None of the other monitoring points listed above had discernable changes in water levels due to external influences.

The lack of water level response due to local or regional influences in monitoring points EPA MW-18A, EPA MW-16A, EPA MW-38A, MW-16, and PZ-13 indicate that the increasing water levels observed at monitor wells EPA MW-30A, EPA MW-34A, EPA MW-43A, EPA MW-55A, EPA MW-45A, and EPA MW-39A are not from regional or other local influences on the system, rather they are a direct result of groundwater injection at IA-11 and IA-12.

5.3 HISTORICAL GROUNDWATER ELEVATION TRENDS

A more detailed analysis of past seasonal water level trends in the northeast area in comparison to the data recently collected following initiation of groundwater injection also was performed. This analysis further highlights the hydraulic barrier effects already being observed due to the groundwater injection and how they are significantly greater than those predicted in the analysis by USEPA (ITSI, 2010).

Claims that the groundwater elevation in Subunit A monitor wells in the northeast area increased as a direct result from the January 2010 storm event and the associated recharge from the Agua Fria River channel are not supported by data trends observed in monitor wells EPA MW-35A, EPA MW-45A, and EPA MW-39A. For example, water levels in these wells began to increase in November 2009, nearly two months before the January 2010 storm event.

These changes in groundwater elevations and resulting shift in groundwater flow directions are attributed to the continuous operation of extraction wells EA-05 and EA-06 for the past 2.5 years and the seasonal operation of supply wells COA-18 and IR- 3B (Figure 9). Historically, monitor well EPA MW-35A has fluctuated seasonally in response to increasing pumping rates during the summer months and declining pumping rates during the winter months in supply wells COA-18 and IR-3B (Figure 9). The groundwater elevation in EPA MW-35A in June 2010 was 1.6 feet higher than in June 2009. In comparison, the groundwater elevation in EPA MW-45A was 6 feet higher in July 2010 than in July 2009. This is a direct result of minimal pumping of COA-18 during January through May 2010 (Figure 9). It should be noted that pumping of COA-18 in June and July 2010 resumed to historical rates and in response, groundwater elevations in EPA MW-45A and EPA MW-35A began to decline. However, since injection commenced in IA-11 and IA-12 in August 2010, groundwater elevations in EPA MW-35A, EPA MW-45A, and EPA MW-39A have increased.

5.4 EVALUATION OF WATER LEVELS AND GROUNDWATER FLOW DIRECTIONS

As stated previously, although groundwater flow data and water level data collected since early 2010 show a north-northwesterly flow direction, our analysis of the proposed three injection well system's performance is not predicated only on this current regional flow direction. Rather, the current observed mounding in the northeast area resulting from injection at IA-11 and IA-12, when superimposed over the August 2009 ambient flow field (base-case conditions of northeasterly regional flow), illustrates that the impact of injection would reverse the flow away from Dysart Road to the west, even for a northeasterly flow base-case situation.

Figure 10 illustrates the Subunit A hydraulic flow-field north of Interstate I-10 in August of 2009 (base-case conditions of northeasterly regional flow). As can be seen, this base case flow-field has a distinctly northeastward flow component in the northeast area with an eastward flow component near EPA MW-30A. Figure 11 superimposes the mounding noted at monitoring points EPA MW-30A, EPA MW-34A, EPA MW-35A, EPA MW-39A, EPA MW-43A, EPA MW-45A, PZ-11, and PZ-12 on September 20, 2010, onto this eastwardly flowing August 2009 flow field. The figure clearly indicates that even if the ambient flow were more eastward than August 2010 conditions, implementation of IA-11 and IA-12 injection would reverse these gradients.

As previously stated, prior to the injection of treated groundwater in injection wells IA-11 and IA-12, the groundwater flow direction in the northeast regions of the interpreted TCE plume was variable but generally showed a northeasterly flow component. However, Figure 11 clearly demonstrates that injection at IA-11 and IA-12 changes the flow direction to the west, away from Dysart Road. It should be noted that IA-13 and EA-07 are not included in this analysis, yet flow is already shifting to the west with two injection wells. The installation of IA-13 and the start up of EA-07 will further enhance the hydraulic barrier in the vicinity of Dysart Road and provide additional protection for the water supply wells to the east.

5.5 GROUNDWATER MODELING ANALYSIS

To bolster our hand calculations and other analysis of the proposed three well reinjection system, we then utilized the July 2010 PGA-North Groundwater Flow Model (AMEC, 2010b) to assess the planned system performance. This model has been approved by the USEPA for performing capture zone analyses in Subunit A and includes the most updated hydraulic parameter values at the site.

The base-case used for these groundwater flow model simulations is the steady-state 2008 case with reduced NAUSP recharge, detailed in the flow model update report of AMEC (2010b). As can be seen, this base flow-field has a distinctly northeastward flow component in the northeast area, with an eastward flow component along Dysart Road between Thomas and McDowell Roads (Figure 12). Capture and mounding analyses based on this northeastward flow field with estimated extraction and injection rates for EA-06 (517 gpm), EA-07 (350 gpm), IA-11 (290 gpm), IA-12 (290 gpm), and IA-13 (290 gpm) indicate that the three injection wells will provide a sufficient hydraulic barrier to contain the Subunit A TCE plume west of Dysart Road, promote groundwater flow away (westward) from Dysart Road, and protect public supply wells in the northeast area of the PGA-North Subunit A TCE plume (Figure 13).

The model simulations support the analysis already presented and clearly illustrate that operation of the three injection wells in concert with the additional extraction from EA-07 will create a hydraulic barrier along Dysart Road, even for an eastward flow direction of base-case conditions in the area.

6.0 REVIEW OF EPA POSITION

Crane Co. understands that the USEPA has looked at water levels in monitor wells interior to the plume and compared them with water levels in sentinel monitor wells in the northeast area to determine that a continuous 1-foot groundwater mound is necessary to maintain a significant hydraulic barrier. Crane Co. contends that the USEPA's assumption that a 1-foot groundwater mound is necessary to maintain a significant hydraulic barrier is not technically justified and is arbitrary. Crane Co. believes a continuous 1-foot mound in groundwater is not necessary to create an effective hydraulic barrier because the overall groundwater gradients in the northeast area are relatively flat.

To determine the mounding necessary to overcome the northeast groundwater flow direction, Crane Co. performed a head difference analysis using August 2009 water level data on wells interior to the plume and sentinel wells around the plume perimeter. August 2009 was selected because during this gauging event many of the northeast area sentinel wells had been installed and groundwater in this area flowed toward the northeast. A review of water levels was conducted using well pairs EPA MW-35A/EPA MW-45A, EPA MW-30A/EPA MW-43A, EPA MW-16A/EPA MW-30A, EPA MW-16A/EPA MW-34A, and EPA MW-16A/EPA MW-39A to facilitate this analysis.

The following table summarizes the head difference between well pairs and the associated groundwater gradients between them based on August 2009 data; the mounding required to overcome the northeast flow direction; and the actual mounding observed at the sentinel wells on September 20, 2010 following only one month of operation of injection wells IA-11 and IA-12. In all but one location, the current mound already is sufficient to provide the necessary hydraulic control. As groundwater injection at wells IA-11 and IA-12 continues and injection well IA-13 and extraction well EA-07 come on-line in the near future, the groundwater mound in the northeast area will only increase, providing greater hydraulic control than already observed.

Well Pair	Head Difference (ft)	Hydraulic Gradient (ft/ft)	Mounding Necessary at Sentinel Well (ft)	Actual Mounding at Sentinel Well (ft) as of Sep 20, 2010
MW-35A/MW-45A	1.56	0.00084	1.81	3.2

MW-30A/MW-43A	0.78	0.00098	1.03	1.4
MW-16A/MW-30A	1.1	0.00068	1.35	0.9
MW16A/MW34A	-0.06	0.00055	None	0.65
MW-16A/MW-39A	-0.04	0.000013	None	1.01
Note: A negative head difference means that August 2009 groundwater elevations in the sentinel wells are higher than water levels in the interior wells. Sentinel wells are considered the outer most wells and are listed as the second well in the well pair. The mounding necessary was computed by adding 0.25 feet to the head difference. Based on August 2009 Water elevation data.				

The USEPA's use of the Theim equation to predict the radius of influence necessary to create a 1-foot mound is hypothetical and not reflective of actual site hydrogeologic conditions. The assumption of drawdown instead of mounding in computing saturated thickness (ITSI, 2010) for injection wells under-predicts the radius of influence by several hundred feet. Furthermore, there appear to be errors in estimated parameter values and the analysis does not provide bounds of uncertainty for the computations. This is clearly demonstrated by the water level data that has been obtained on a weekly basis since the groundwater injection in IA-11 and IA-12 began. As previously stated, the current water level data suggests that the radius of influence from the developing groundwater mound is much greater than the hypothetical values predicted by the USEPA in their August 24, 2010 Technical Memorandum.

7.0 CONCLUSIONS

- The Crane Co. technical proposal of three injection wells (IA-11, IA-12 and IA-13) operating in concert with EA-06 and EA-07 will be protective and will provide a complete and effective hydraulic barrier to eastern groundwater flow along Dysart Road.
- USEPA's position establishing a one-foot water level increase as the cut-off for the distance away from an injection well in which sufficient mounding is present for hydraulic control is arbitrary and does not take site specific data into account.

Crane Co. respectfully requests USEPA take the full measure of the time allotted under the Consent Decree to review the new and changing data presented in this document and carefully consider the facts presented. Crane Co. will continue to collect data – including the new information available following the start-up of EA-07 at the end of this month and share it with USEPA to aid in this review.

Crane Co. is confident the data presented in this Statement of Position, augmented by data to be provided in the near future will provide USEPA with a sufficient technical basis to rescind the demand for the two unneeded additional injection wells. Instead of deploying resources to install the two unneeded injection wells, a better remedial approach would be to utilize the resources to address other technically justified remedial activities at the site.

8.0 REFERENCES

AMEC Geomatrix, 2010a. *Amended Draft Comprehensive Regional Approach for Northeast Subunit A TCE Plume Capture Augmentation and Treatment Workplan*. May 20, 2010

AMEC Geomatrix, 2010b. *July 2010 PGA North Flow Model Update Memo.* July 15, 2010.

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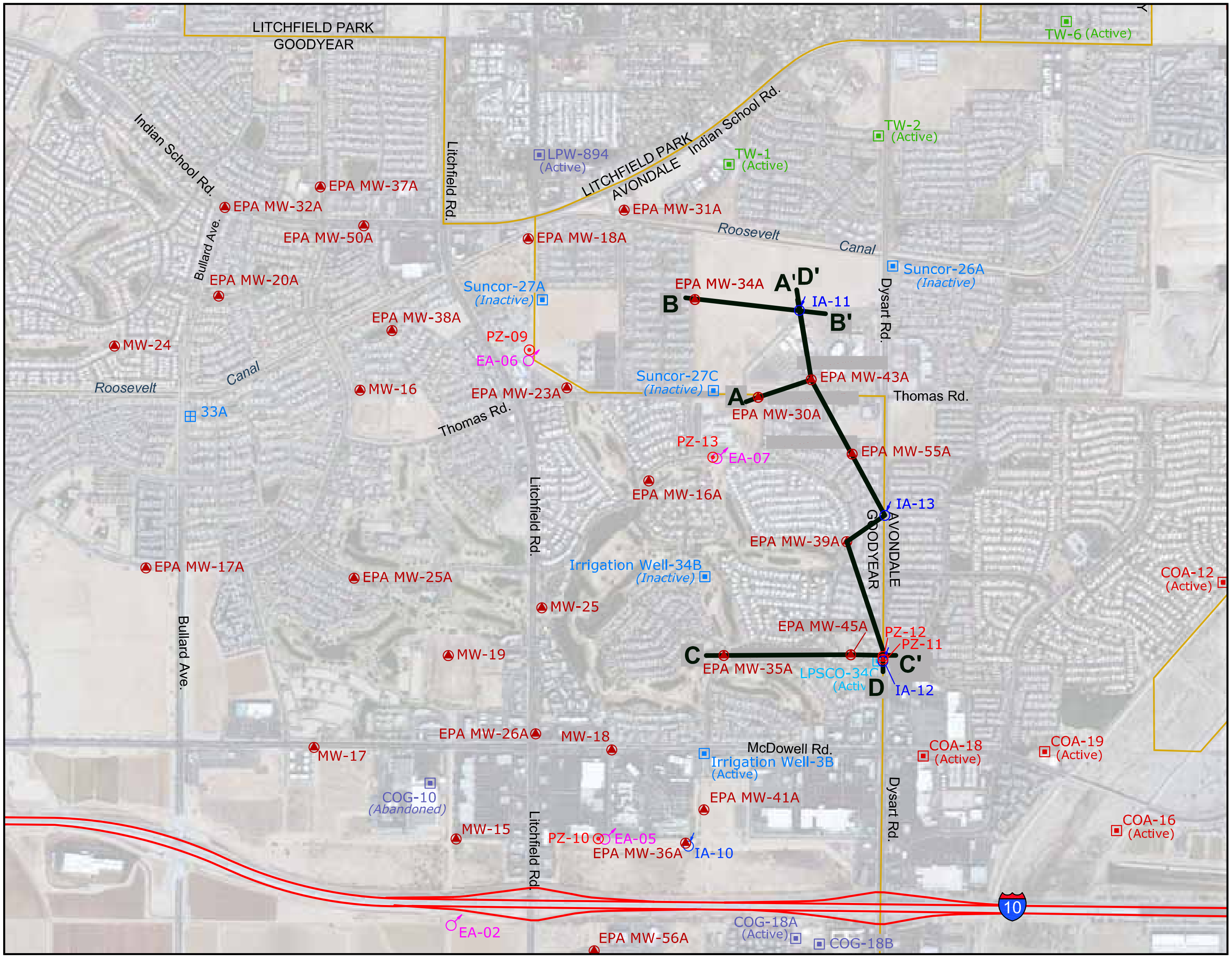
FIGURES



Explanation

EPA MW-55A	Subunit A monitor well
PZ-13	Piezometer
EA-07	Subunit A extraction well
IA-13	Injection well (treated water)
33A	SunCor / UPI treatment system well
Irrigation Well-3B	Palm Valley / SunCor irrigation well
LPSCO-34C	Litchfield Park Services Co. production well
COG-18A	City of Goodyear well
COA-19	City of Avondale supply well
TW-1	Algonquin water services well
A —— A'	Line of cross section

N

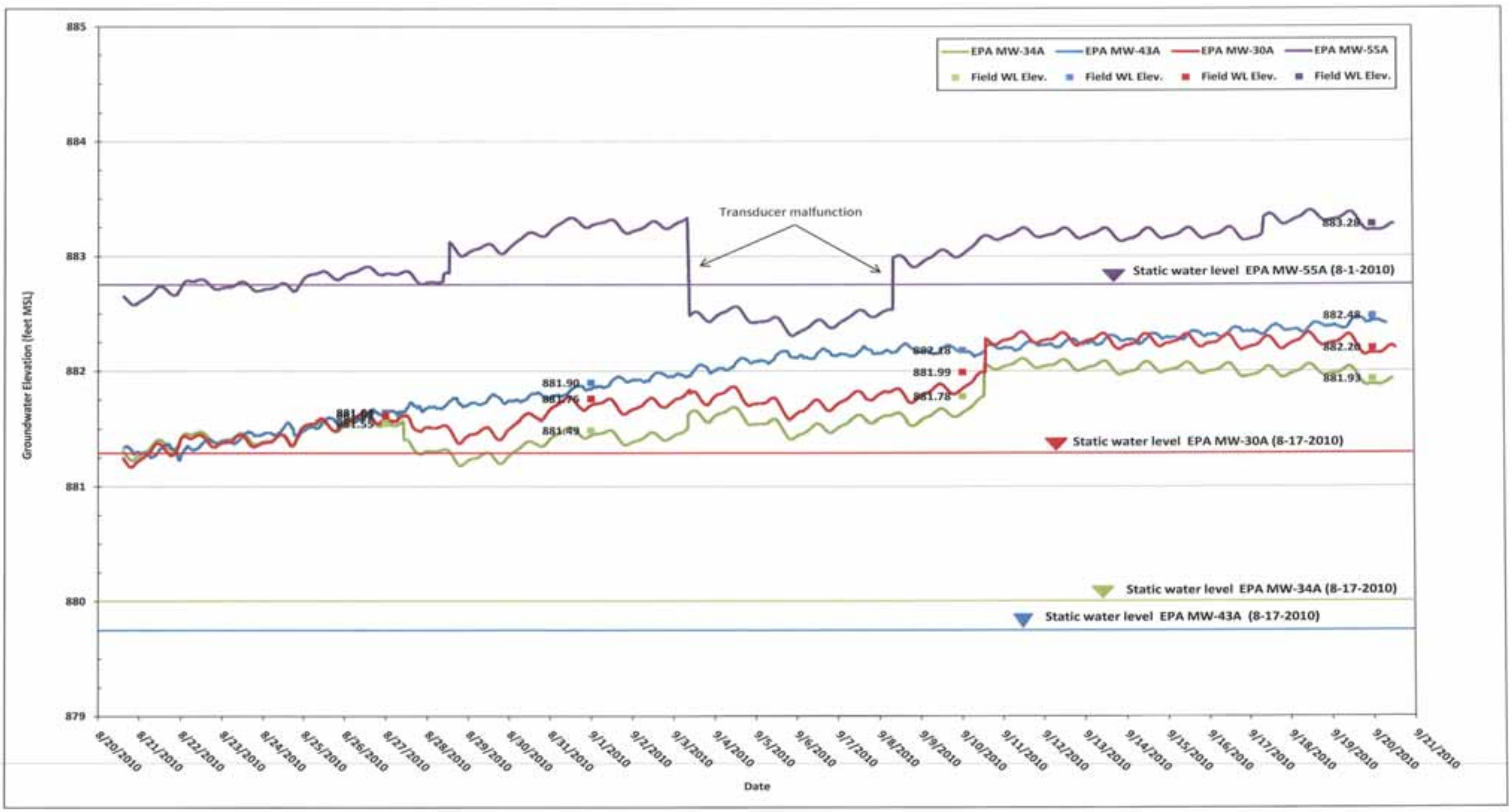
Approximate scale in feet
0 750 1500
0 225 450
Approximate scale in meters

CROSS SECTION LOCATION MAP

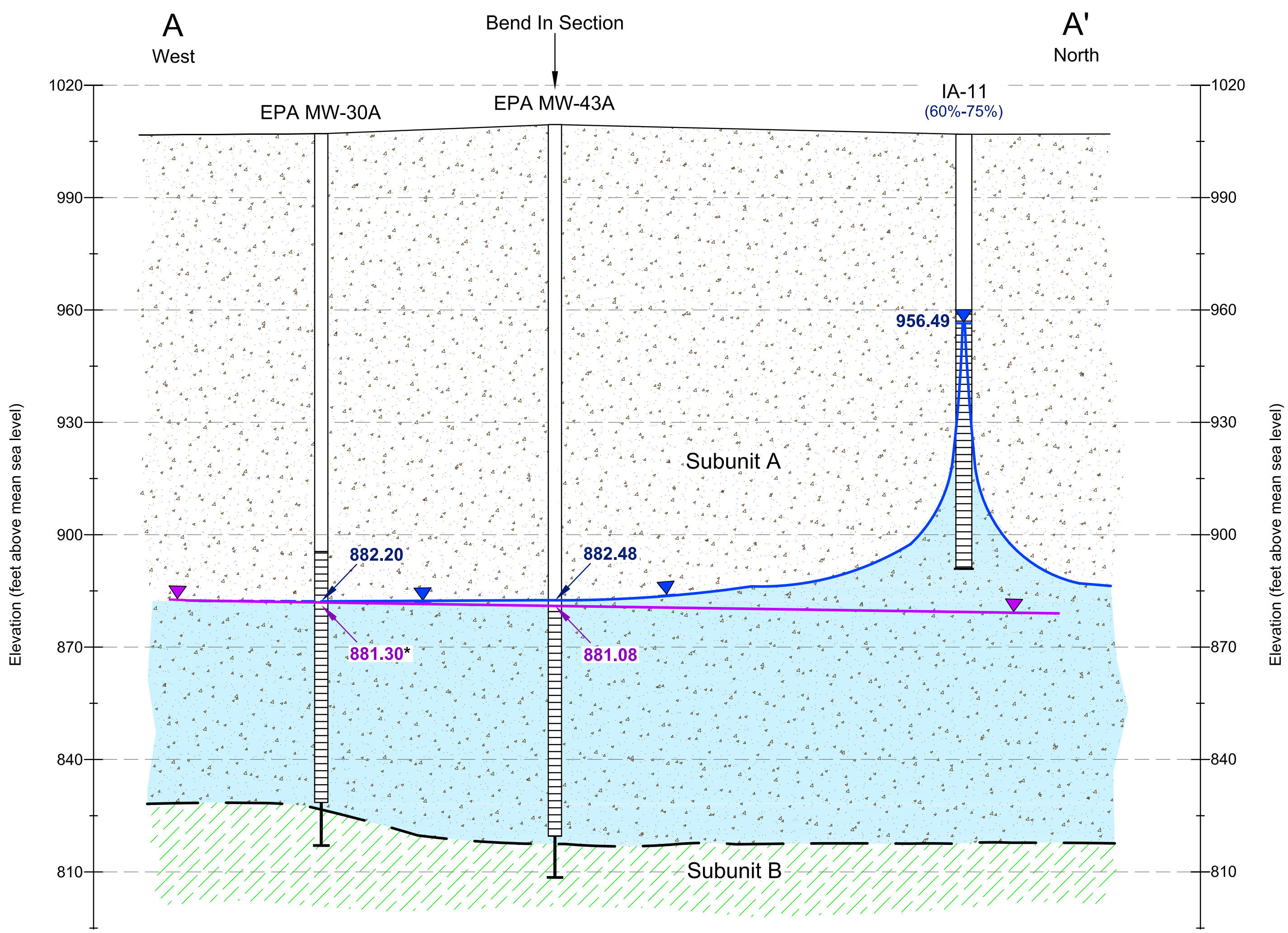
Phoenix Goodyear Airport North Superfund Site
Goodyear, Arizona

By: jrw	Date: 9/22/10	Project No. 014682
AMEC Geomatrix	Figure 1	

Plot Date: 09/22/10 - 8:58am, Plotted by: joanna.worker
Drawing Path: W:\Projects\014682.000.0 (PGA-North)\ACAD\, Drawing Name: Xsect Location Map.dwg



AMEC Geomatrix	OBSERVATION WELLS MW-30A, MW-43A, MW-34A, and MW-55A RESPONSE TO IA-11 INJECTION Phoenix-Goodyear Airport-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 09/27/2010	Project No. 0146821030 Figure No. 2



Explanation

Well

Screen interval

Total boring depth

(60%-75%) Percentage of flow injected from EA-06

882.48 Groundwater elevation in feet above mean sea level

Water elevation as of 9/20/10

Water elevation as of 8/17/10

* As of 8/1/10

Subunit A

Subunit B

Saturated alluvium in Subunit A

Inferred lithologic contact

Approximate vertical scale in feet: 0, 15, 30

Approximate scale in feet: 0, 200, 400

CROSS SECTION A-A'

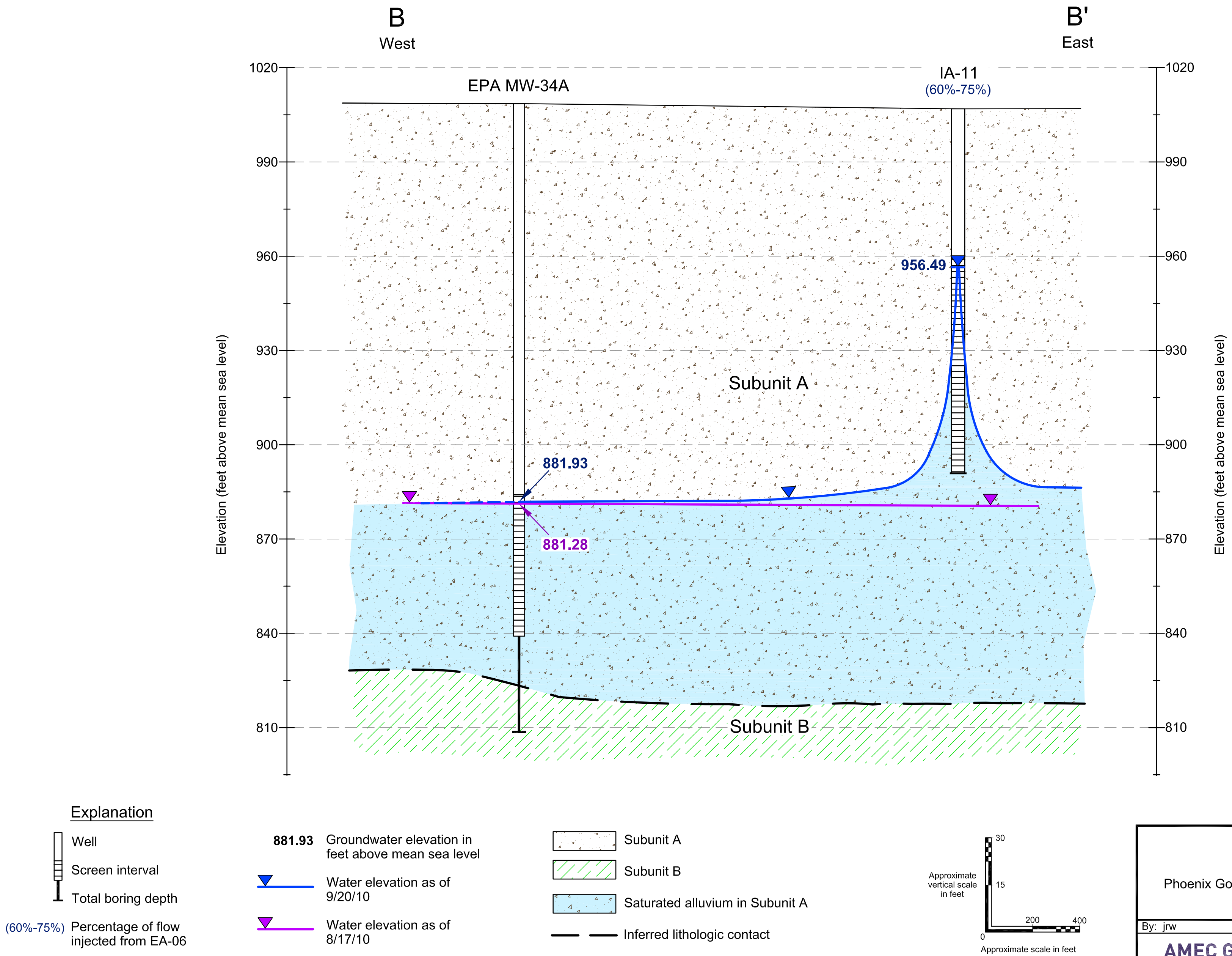
Phoenix Goodyear Airport North Superfund Site
Goodyear, Arizona

By: jrw | Date: 9/24/10 | Project No. 014682

AMEC Geomatrix

Figure 3

Plot Date: 09/24/10 - 4:33pm, Plotted by: joanna.worker
Drawing Path: W:\Projects\014682.000.0 (PGA-North)\ACAD\, Drawing Name: Xsect A.dwg

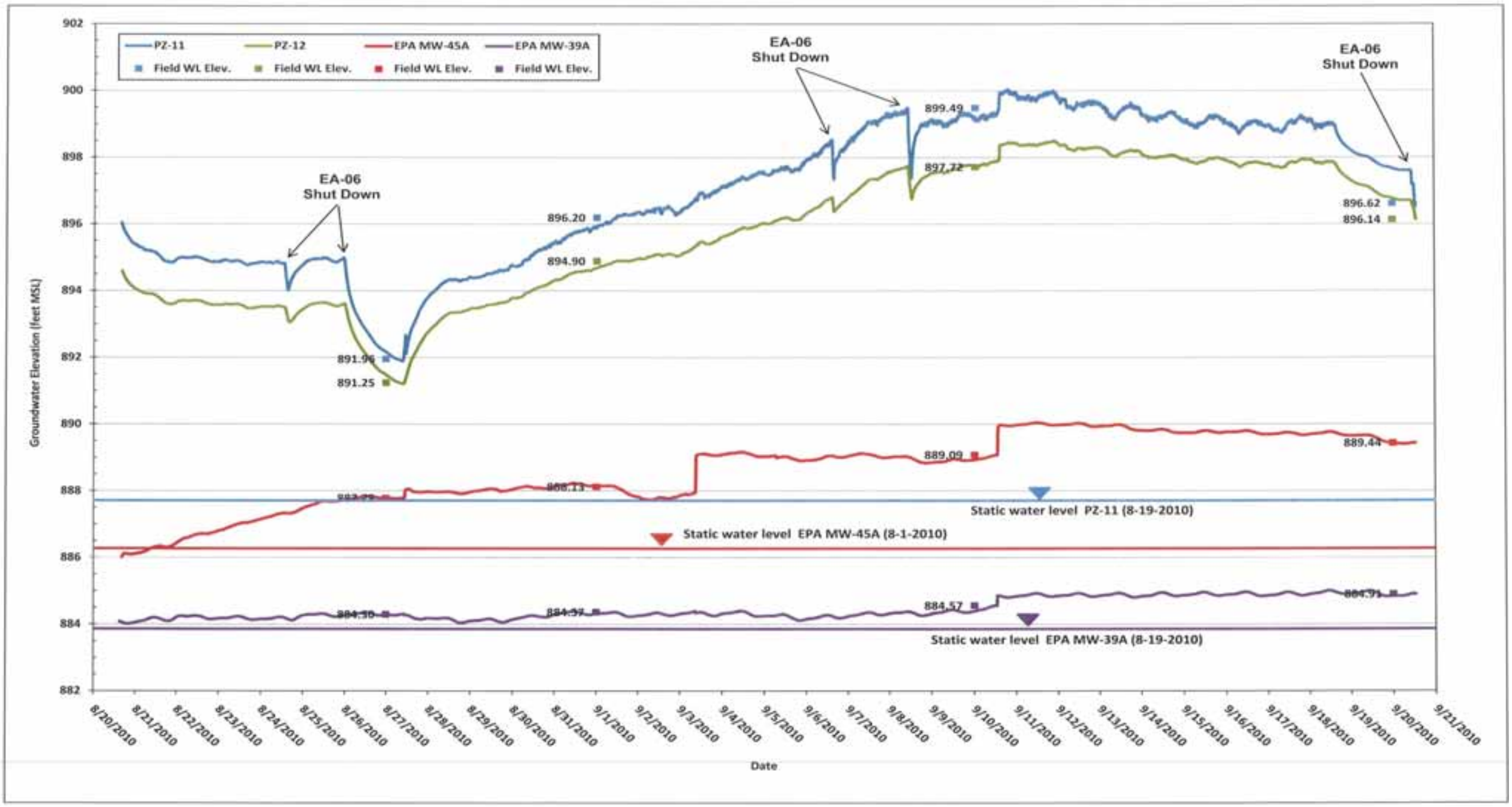


CROSS SECTION B-B'

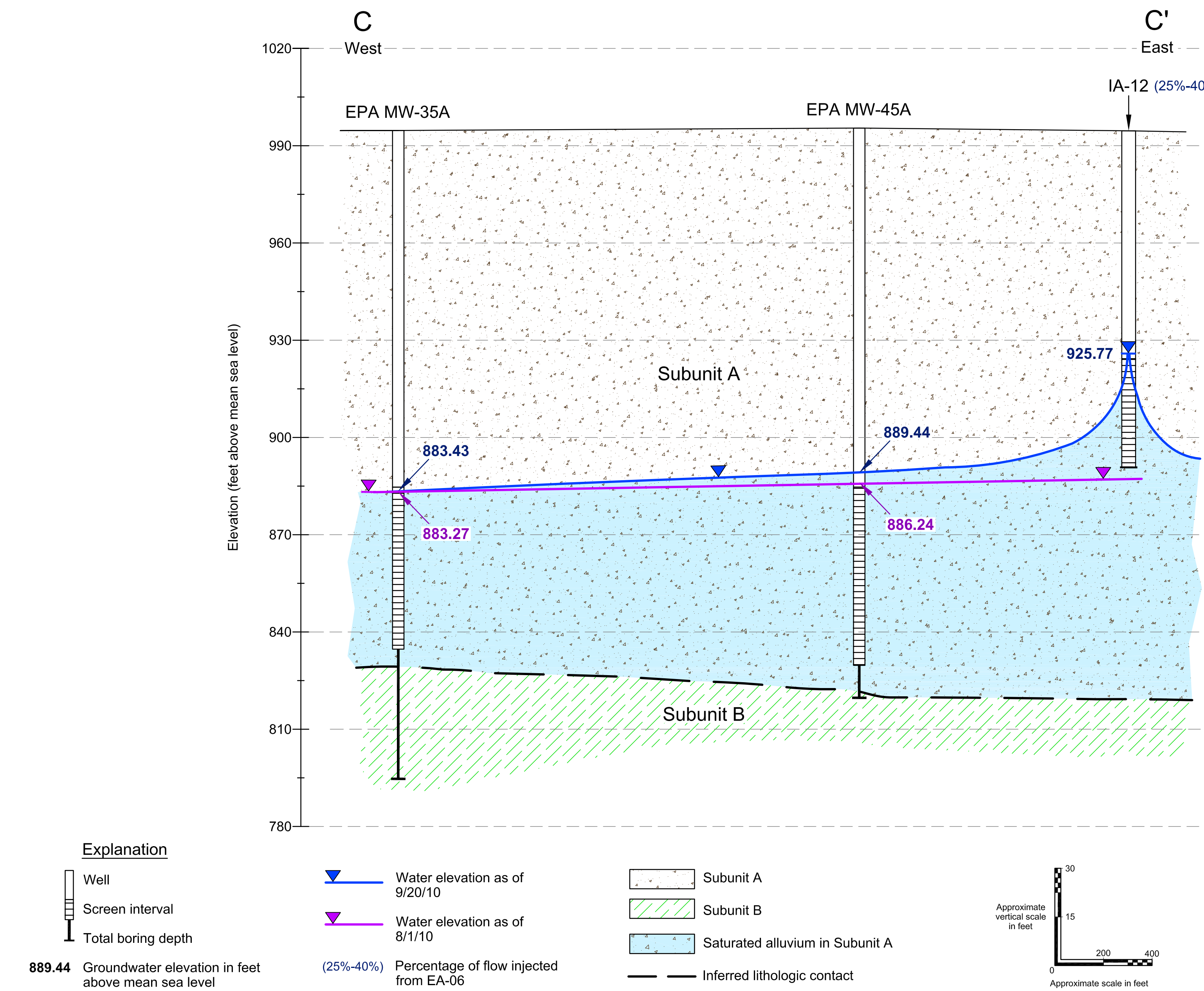
Phoenix Goodyear Airport North Superfund Site
Goodyear, Arizona

By: jrw	Date: 9/24/10	Project No. 014682
AMEC Geomatrix		Figure 4

Plot Date: 09/24/10 - 4:36pm, Plotted by: joanna.worker
Drawing Path: W:\Projects\014682.000.0 (PGA-North)\ACAD\, Drawing Name: Xsect B.dwg



AMEC Geomatrix	OBSERVATION WELLS PZ-11, PZ-12, MW-45A, and MW-39A RESPONSE TO IA-12 INJECTION Phoenix-Goodyear Airport-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 09/27/2010	Project No. 0146821030 Figure No. 5

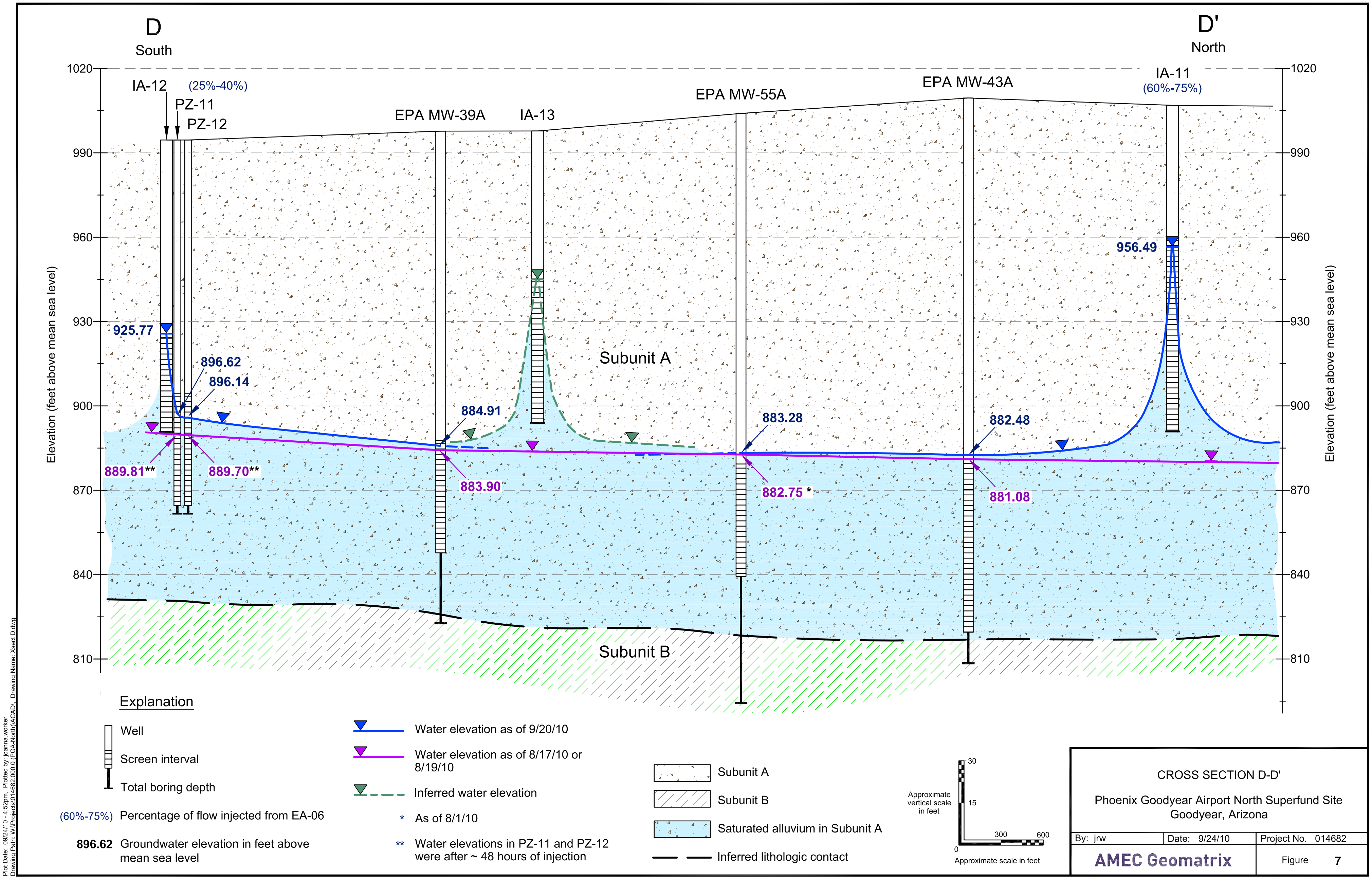


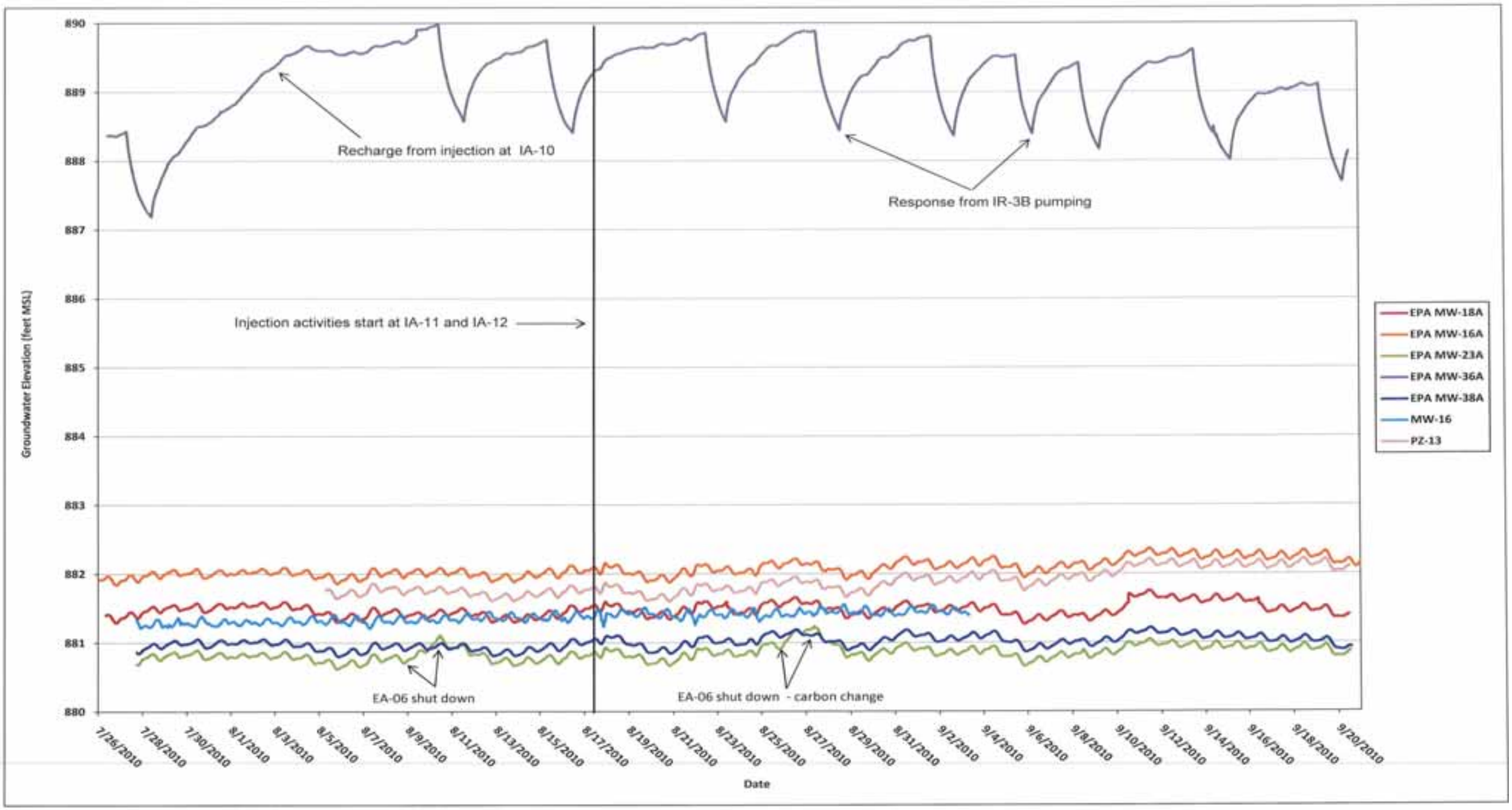
CROSS SECTION C-C'

Phoenix Goodyear Airport North Superfund Site
Goodyear, Arizona

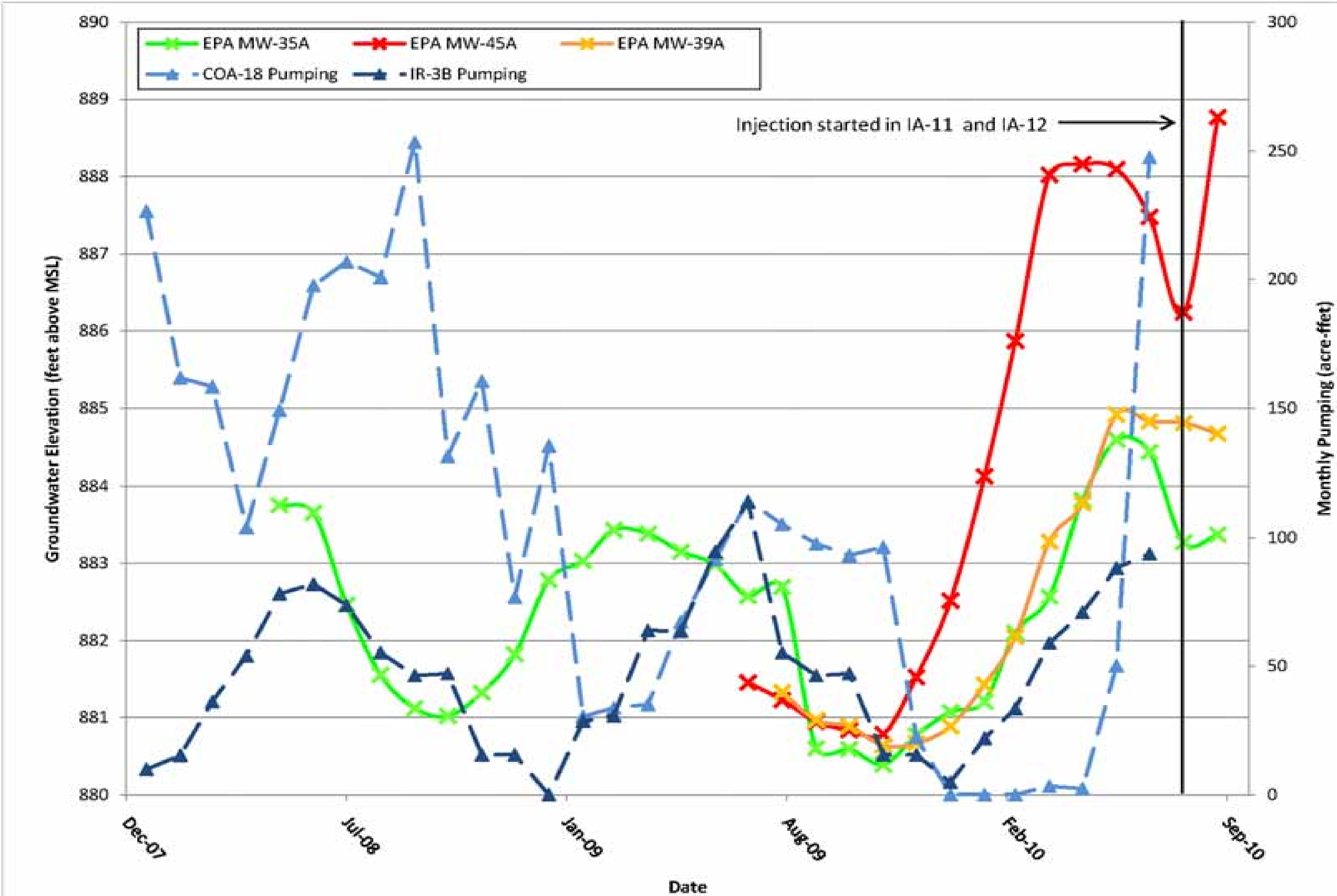
By: jrw	Date: 9/24/10	Project No. 014682
AMEC Geomatrix		Figure 6

Plot Date: 09/24/10 - 4:39pm, Plotted by: joanna.worker
Drawing Path: W:\Projects\014682.000.0 (PGA-North)\ACAD\, Drawing Name: Xsect C.dwg


D
South
D'
North
1020
990
960
930
900
870
840
810
Elevation (feet above mean sea level)
IA-12
(25%-40%)
PZ-11
PZ-12
EPA MW-39A
IA-13
EPA MW-55A
EPA MW-43A
IA-11
(60%-75%)
925.77
896.62
896.14
884.91
883.28
882.48
956.49
889.81**
889.70**
883.90
882.75 *
881.08
Subunit A
Subunit B
Explanation
Well
Screen interval
Total boring depth
(60%-75%) Percentage of flow injected from EA-06
896.62 Groundwater elevation in feet above mean sea level
Water elevation as of 9/20/10
Water elevation as of 8/17/10 or 8/19/10
Inferred water elevation
* As of 8/1/10
** Water elevations in PZ-11 and PZ-12 were after ~ 48 hours of injection
Subunit A
Subunit B
Saturated alluvium in Subunit A
Inferred lithologic contact
Approximate vertical scale in feet
30
15
0
300
600
Approximate scale in feet
CROSS SECTION D-D'
Phoenix Goodyear Airport North Superfund Site
Goodyear, Arizona
By: jrw
Date: 9/24/10
Project No. 014682
AMEC Geomatrix
Figure 7
Plot Date: 09/24/10 - 4:52pm, Plotted by: joanna.worker
Drawing Path: W:\Projects\014682.000.0 (PGA-North)\ACAD\, Drawing Name: Xsect D.dwg

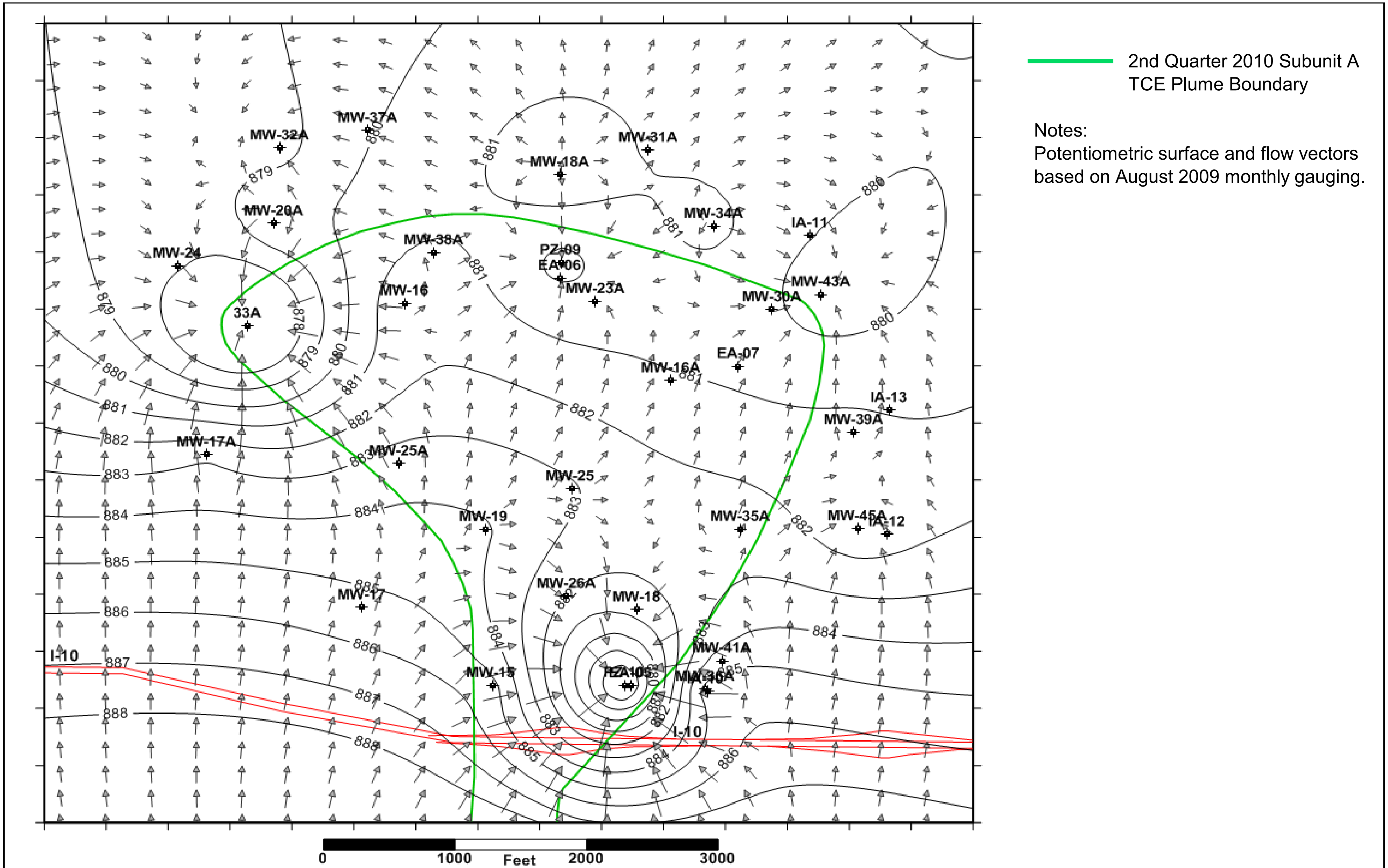


AMEC Geomatrix	LOCAL/REGIONAL TRENDS IN POTENTIOMETRIC SURFACE Phoenix-Goodyear Airport-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 09/27/2010	Project No. 0146821030 Figure No. 8

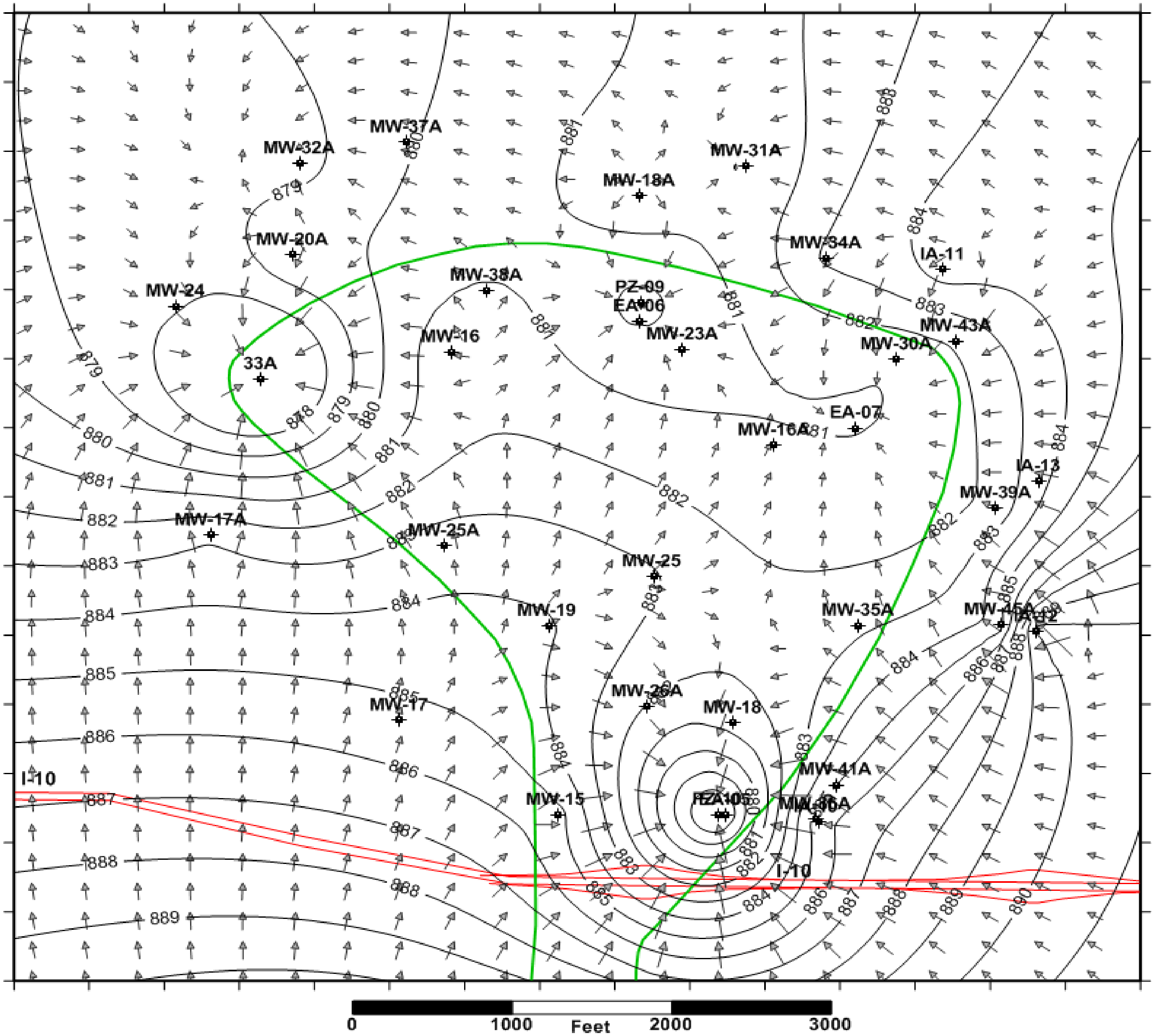


Notes:
IR-3B monthly pumping rates for 2010 are an average of 2008 and 2009 data.

AMEC Geomatrix	COA-18 and IR-3B PUMPING vs. NORTHEAST WATER LEVELS PGA-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 9/27/2010	Project No. 0146821030 Figure No. 9



AMEC Geomatrix	AUGUST 2009 SUBUNIT A POTENTIOMETRIC SURFACE PGA-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 9/27/2010	Project No. 0146821030 Figure No. 10



2nd Quarter 2010 Subunit A TCE Plume Boundary

Notes:
Potentiometric surface and flow vectors based on August 2009 monthly gauging after 34 days of injection at IA-11 and IA-12.

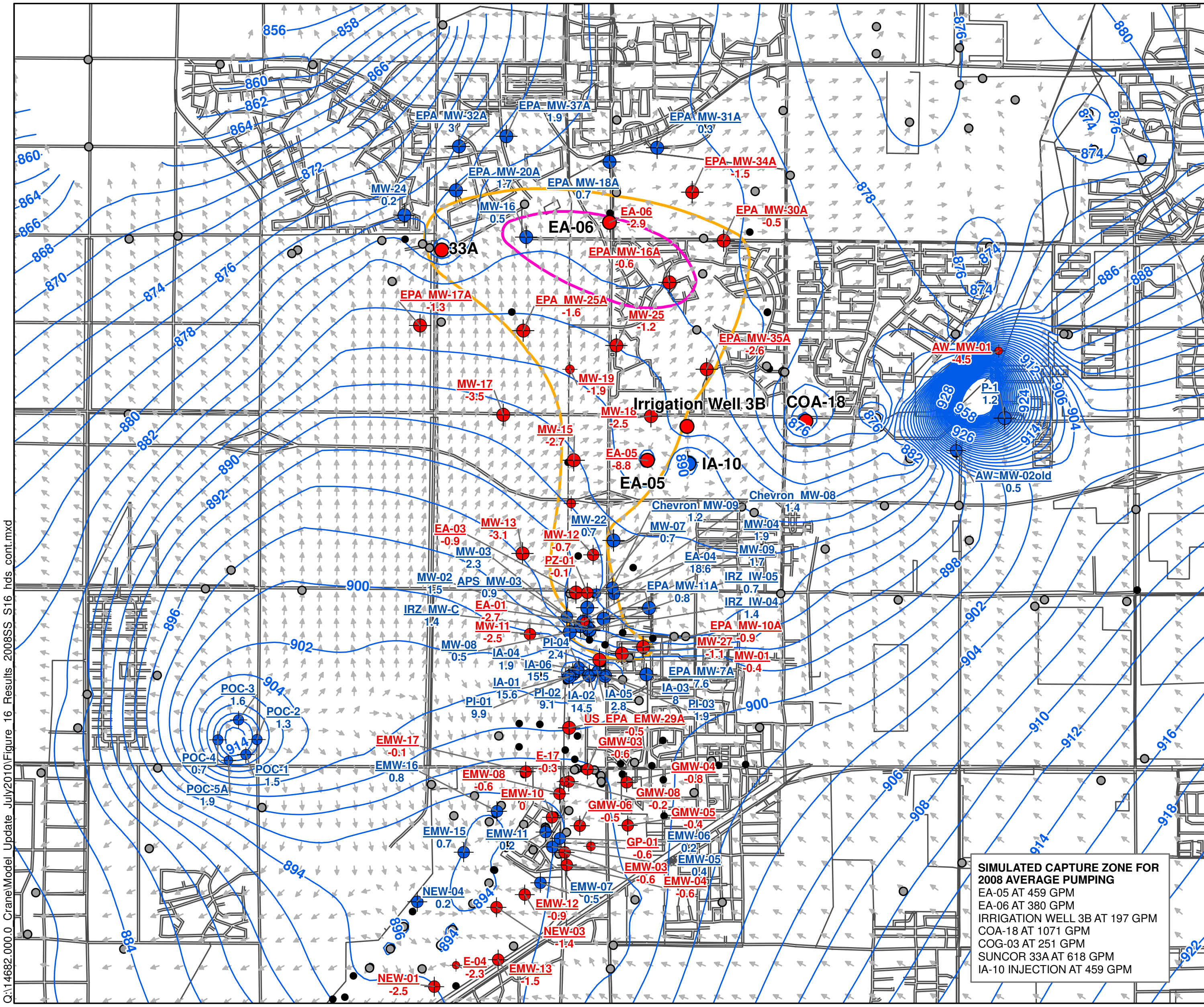
Hand level measuremnents from PZ-11, PZ-12, 34A, 39A, 45A, 35A, 43A, and 30A, collected on September 20 used in contouring interpretation.

Potentiometric surface and flow vectors do not include mounding data at injection wells IA-11 and IA-12.

Extraction at EA-07 not included in interpretation.

Injection was interupted for approx. 34 hours for a carbon change out at EA-06.

AMEC Geomatrix	SEPTEMBER 20, 2010 SUBUNIT A POTENTIOMETRIC SURFACE PGA-North Superfund Site Goodyear, Arizona	Figure by PRJ Date 9/27/2010	Project No. 0146821030 Figure No. 11



Q:\14682.000.0_CraneModel_Update_July2010\Figure_16_Results_2008SS_S16_hds_cont.mxd

Explanation

- Injection and Pumping well
- EA-05, EA-06, Irrigation Well 3B, 33A, COA-18
- IA-10
- Monitoring well
- MW-07 0.7 — Well with residual: blue - positive residual, red - negative residual
- Target weights: 0.1, 0.2, 0.25, 0.5, 1
- Simulated groundwater elevation (ft. amsl)
- Velocity vectors
- Inferred Subunit A TCE (ug/l) Boundary (Based on February 2010 Data) From AMEC Geomatrix: 5, 100

N

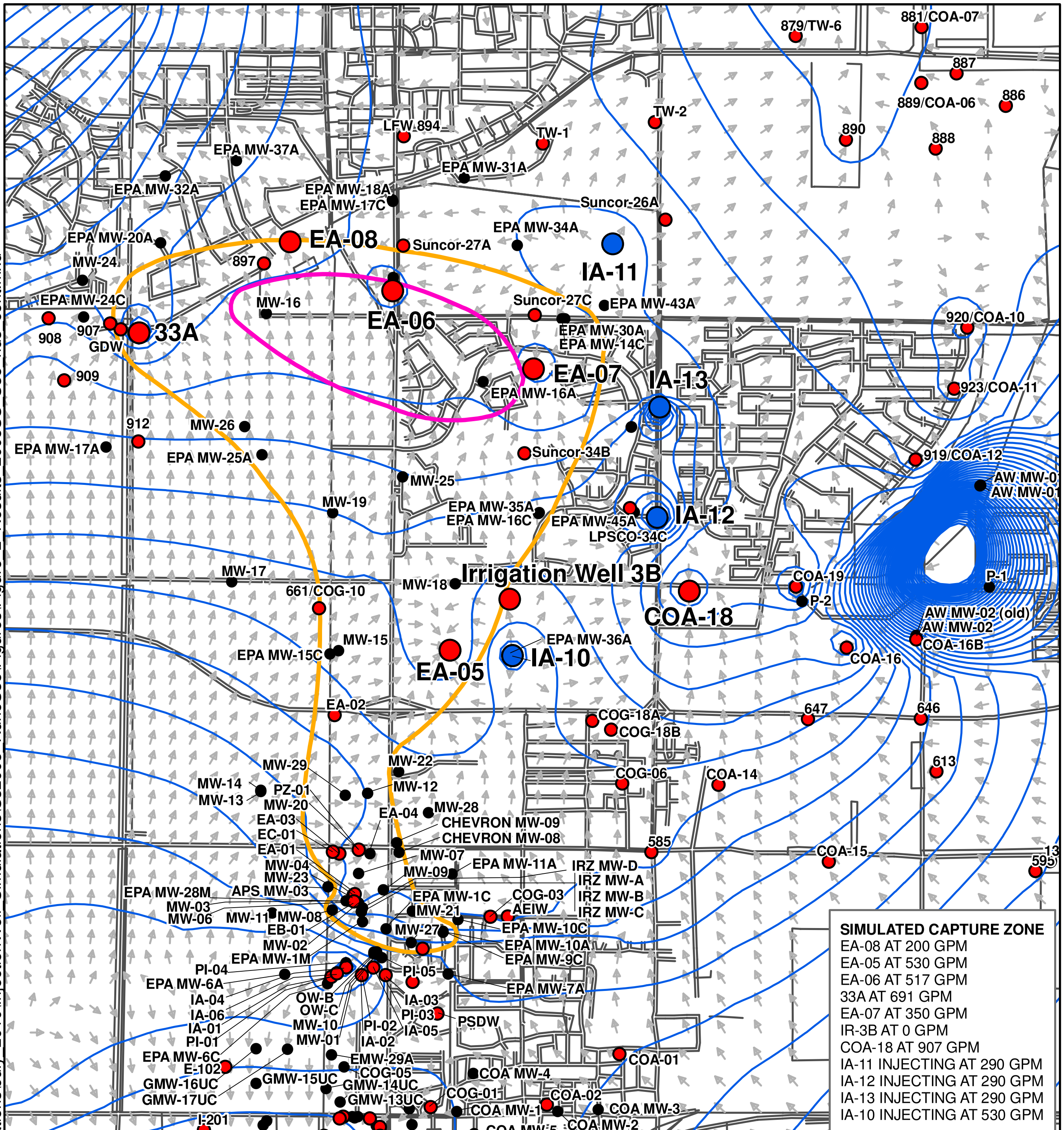
0 1,500 3,000

Approximate Scale in Feet

SIMULATED WATER LEVEL CONTOURS AND WEIGHTED RESIDUALS IN SUBUNIT A FOR SIMULATION OF STEADY-STATE AVERAGE 2008 CONDITIONS WITH REDUCED NAUSP RECHARGE TO EVALUATE CAPTURE
Phoenix-Goodyear Airport-North Superfund Site
Goodyear, Arizona

By: amv	Date: 9/22/2010	Project No. 14682
AMEC Geomatrix	Figure	12

Q:\14682.000.0_Crane\model\WellEvaluationSimulations\July_2010\InjectionWell_Simulations\Ss2008_RuneS35\Figures\Figure_2_Results_2008SS_S35_hds_cont.mxd



SIMULATED CAPTURE ZONE
EA-08 AT 200 GPM
EA-05 AT 530 GPM
EA-06 AT 517 GPM
33A AT 691 GPM
EA-07 AT 350 GPM
IR-3B AT 0 GPM
COA-18 AT 907 GPM
IA-11 INJECTING AT 290 GPM
IA-12 INJECTING AT 290 GPM
IA-13 INJECTING AT 290 GPM
IA-10 INJECTING AT 530 GPM

Explanation

- Pumping well
- EA-05, EA-06, EA-07, EA-08, Irrigation Well 3B, 33A, COA-18
- Injection well
- IA-10, IA-11, IA-12, IA-13
- Monitoring well
- Simulated groundwater elevation (ft. amsl)
- Velocity vectors
- Inferred Subunit A TCE (ug/l) Boundary (Based on February 2010 Data) From AMEC Geomatrix.
  - 5
  - 100

N

0 1,500 3,000
Approximate Scale in Feet

SIMULATED WATER LEVEL CONTOURS IN SUBUNIT A FOR SIMULATION OF EA-06, EA-07. EA-08 AND THREE INJECTION WELLS USING STEADY-STATE 2008 CONDITIONS WITH REDUCED NAUSP RECHARGE TO EVALUATE CAPTURE
Phoenix-Goodyear Airport-North Superfund Site
Goodyear, Arizona

By: amv | Date: 9/15/2010 | Project No. 14682

AMEC Geomatrix | Figure 13